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2003 年 4 月 3 日 (03.04.2003)

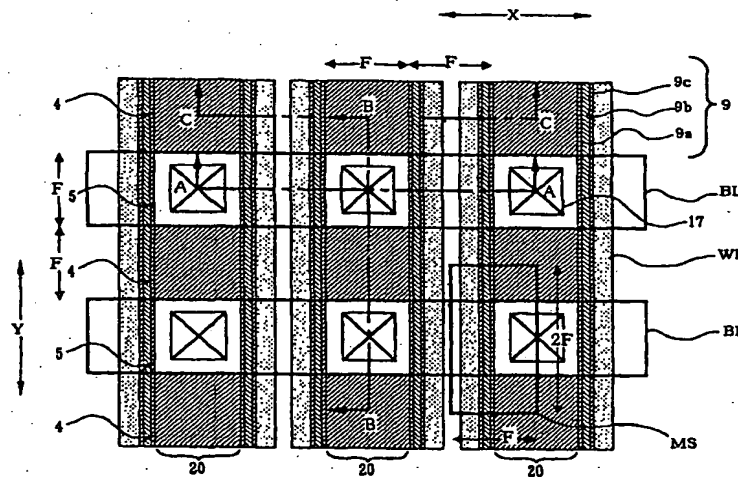
PCT

(10) 国際公開番号  
WO 03/028112 A1

- (51) 国際特許分類<sup>7</sup>: H01L 29/792, 27/115, 21/8247 (SHUKURI,Shoji) [JP/JP]; 〒187-8588 東京都小平市上水本町五丁目 20 番 1 号 株式会社日立製作所 半導体グループ内 Tokyo (JP).
- (21) 国際出願番号: PCT/JP02/04080
- (22) 国際出願日: 2002 年 4 月 24 日 (24.04.2002) (74) 代理人: 秋田 収喜 (AKITA,Shuki); 〒114-0013 東京都北区東田端 1 丁目 13 番 9 号 ツインビル田端 B 2 階 Tokyo (JP).
- (25) 国際出願の言語: 日本語
- (26) 国際公開の言語: 日本語 (81) 指定国 (国内): CN, JP, KR, SG, US.
- (30) 優先権データ: 特願2001-287917 2001 年 9 月 20 日 (20.09.2001) JP (84) 指定国 (広域): ヨーロッパ特許 (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR).
- (71) 出願人 (米国を除く全ての指定国について): 株式会社日立製作所 (HITACHI, LTD.) [JP/JP]; 〒101-8010 東京都千代田区神田駿河台四丁目 6 番地 Tokyo (JP). 添付公開書類:  
— 国際調査報告書
- (72) 発明者; および 2 文字コード及び他の略語については、定期発行される各 PCT ガゼットの巻頭に掲載されている「コードと略語のガイダンスノート」を参照。
- (75) 発明者/出願人 (米国についてのみ): 宿利 章二

(54) Title: SEMICONDUCTOR INTEGRATED CIRCUIT DEVICE AND ITS MANUFACTURING METHOD

(54) 発明の名称: 半導体集積回路装置及びその製造方法



(57) Abstract: A semiconductor integrated circuit device has a column array comprising semiconductor columns and insulator columns arranged alternately in one direction; nonvolatile storage elements provided in the semiconductor columns, respectively, wherein the side face of the semiconductor column in the one direction is provided with a control gate electrode with a gate insulation film in between, the top face of the semiconductor column a drain region, and the bottom face of the semiconductor column a source region; and a wiring which includes the control gate electrodes of the nonvolatile storage elements and is provided in the one direction on the side face of the column array in the one direction

[続葉有]



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(57) 要約:

半導体集積回路装置は、半導体柱と絶縁体柱が一方向に交互に敷き詰めた状態で複数配置された柱列と、

前記複数の半導体柱に夫々設けられた複数の不揮発性記憶素子であって、前記半導体柱の前記一方向に沿う側面にゲート絶縁膜を介在して制御ゲート電極が設けられ、前記半導体柱の上面部にドレイン領域が設けられ、かつ前記半導体柱の底面部にソース領域が設けられた複数の不揮発性記憶素子と、

前記複数の不揮発性記憶素子の夫々の制御ゲート電極を含み、かつ前記柱列の前記一方向に沿う側面に前記一方向に沿って設けられた配線とを有する。

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP02/04080

## A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl<sup>7</sup> H01L29/792, 27/115, 21/8247

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl<sup>7</sup> H01L29/792, 27/115, 21/8247

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1926-1996	Jitsuyo Shinan Toroku Koho	1996-2002
Kokai Jitsuyo Shinan Koho	1971-2002	Toroku Jitsuyo Shinan Koho	1994-2002

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

JOIS, The IEEE/IEE Electronic Library Online

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 6-13628 A (Semiconductor Energy Laboratory Co., Ltd.), 21 January, 1994 (21.01.94), Full text	1-3, 7-14, 16
Y	Full text	4-6, 15, 17, 22, 23, 27-30
A	Full text (Family: none)	18-21, 31, 32
Y	US 5882994 A (Kabushiki Kaisha Toshiba), 16 March, 1999 (16.03.99), Columns 3, 4 & EP 767489 A & JP 9-97850 A Par. Nos. [0022], [0032]	4

☒ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search  
29 July, 2002 (29.07.02)

Date of mailing of the international search report  
13 August, 2002 (13.08.02)

Name and mailing address of the ISA/  
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP02/04080

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2001-24075 A (Sony Corp.), 26 January, 2001 (26.01.01), Par. Nos. [0068] to [0074]; Fig. 17 (Family: none)	5
Y	JP 2-117175 A (Matsushita Electronics Corp.), 01 May, 1990 (01.05.90), Page 3, upper right column, line 15 to lower left column, line 3 (Family: none)	6, 17
Y	JP 10-229177 A (Samsung Electronics Co., Ltd.), 25 August, 1998 (25.08.98), Par. Nos. [0007] to [0008] (Family: none)	15
Y	JP 63-285966 A (Fujitsu Ltd.), 22 November, 1988 (22.11.88), Page 5, upper left column to lower left column; Fig. 1 (Family: none)	22, 23
Y	US 5888868 A (Semiconductor Energy Laboratory Co., Ltd.), 30 March, 1999 (30.03.99), Column 15; Figs. 14A to 14H & JP 9-205187 A Example 2; Fig. 3	27
X	US 5959322 A (Samsung Electronics Co., Ltd.), 28 September, 1999 (28.09.99), Full text & KR 123751 B                      & JP 7-122653 A Full text	31, 32
A	IEEE Electron Device Letters, Vol.14, No.8, pages 415 to 417, August 1993	1-32

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP02/04080

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:

because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 24-26

because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

The inventions of claims 24-26 relate to a method comprising "the step of forming a wiring on the side face of a protruding island region by anisotropically etching the conductive film and of forming a contact region integrated with the wiring". (continued to extra sheet)

3. ☐ Claims Nos.:

because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐

The additional search fees were accompanied by the applicant's protest.

☐

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP02/04080

Continuation of Box No.I-2 of continuation of first sheet(1)

However, how the wiring and the contact region are formed simultaneously by anisotropic etching is not described. Therefore, it is unclear what the above-mentioned step defines specifically.

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